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Article

Use of Monolingual English Guidelines to Assess Stuttering in Bilingual Speakers: A Systematic Review

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Abstract

Speech-language pathologists can identify stuttering in multiple languages, even if they do not speak the language. However, due to differences in language development, multilingual speakers have been documented with higher levels of typical disfluencies in their speech than monolingual speakers. These higher levels of disfluency put multilingual speakers at greater risk of misdiagnosis as individuals who stutter, due to poor understanding of the nature of the manifestation of stuttering in two or more languages and reliance on monolingual-English diagnostic criteria. The purpose of the present systematic review is to explore how stuttering is identified in multilingual speakers who are described as participants who stutter, and whether monolingual English-speaking guidelines were the most commonly used reference for determining the presence of stuttering.

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Introduction

Speech-language pathologists commonly report challenges evaluating children who speak more than one language (e.g. Boerma & Blom, 2017; Grimm & Schulz, 2014; Hemsley, Holm & Dodd, 2014). The variation in speech-language development that is inherent to multilingualism is often misinterpreted as a disorder (e.g. Bedore & Peña, 2008; Paradis, Nicoladis, Crago & Genesee, 2011). It has also been reported that children who lack native-like proficiency in both their first and second languages are at significantly higher risk of false-positive identification as having a language impairment (Kohnert, 2010). Recent research suggests this risk of misdiagnosing typically developing multilingual children as disordered may extend to developmental stuttering (Byrd, Watson, Bedore, & Mullis, 2015a).

Assessing typical and atypical speech disfluencies

Preliminary data demonstrate that clinicians have significant difficulty discriminating typical from atypical speech disfluency in children who speak both Spanish and English (Byrd et al., 2015a). Recent findings also suggest that speech-language pathologists inaccurately perceive speaking more than one language as a risk factor for the onset and/or persistence of stuttering (Byrd, Haque, & Johnson, 2016). This misidentification and misperception may be related to the minimal criteria used to determine multilingualism in speakers who stutter (Eggers, 2010; Coalson, Peña & Byrd, 2013; Werle, Byrd & Coalson, 2019) and, more pertinent to this study, the inappropriate criteria used to determine stuttering in speakers who are multilingual. Given that the typically fluent multilingual child produces frequencies of disfluencies that are higher than that reported for monolingual children who stutter, the standard practice of diagnosing stuttering based on criteria derived from monolingual English speakers may result in an overrepresentation of stuttering within the multilingual population.

Assessment of speech disfluencies provides valuable insight into the linguistic and motoric effort required for spoken communication in multilingual speakers. Expressions such as 'word fluency' and 'second language fluency' tasks reflect this concept. Breakdowns in speech fluency are more likely when children attempt to produce utterances that are longer and/or more grammatically complex than their emerging linguistic capacity (Zackheim & Conture, 2003). Whether the multilingual speaker has limited and/or high proficiency

in both languages, their linguistic knowledge is not limited to one language; rather, it is spread across the two or more languages they speak (Bedore & Peña, 2008) Thus, it is not surprising that multilingual children experience elevated levels of disfluency because, unlike monolingual children, they have to navigate more than one language system (Bedore, Fiestas, Peña & Nagy, 2006; Byrd, Bedore & Ramos, 2015b; Byrd, 2018).

Identifying stuttering in multilingual speakers

Multiple studies confirm that speech-language pathologists can use monolingual English guidelines to accurately assess stuttering in non-English monolingual speakers (e.g. Dutch: Boey, Wuyts, Van de Heyning, De Bodt & Heylen, 2007; French: Leclercq, Suaire & Moyse, 2017; German: Natke, Sandrieser, Pietrowsky & Kalveram, 2006; cf. Watson, Byrd & Carlo, 2011). Further research indicates that clinicians can identify stuttering severity in speakers of more than one language with high levels of accuracy, even when they are unfamiliar with the languages the speakers are producing (Bosshardt, Packman, Blomgren & Kretschmann, 2016; Cosyns, Einarsdottir & Van Borsel, 2015; Hoffman, Wilson, Copley, Hewatt & Lim, 2014; Lee, Robb, Ormond & Blomgren, 2014). Discriminating whether disfluencies are typical or atypical in multilingual speakers who do stutter versus those who do not may prove to be more challenging than previously thought, particularly if the speech-language pathologist is using the monolingual English-speaking guidelines to guide their diagnostic decision.

For example, in Byrd et al. (2015a), 14 bilingual Spanish–English speech-language pathologists were asked to diagnose two Spanish–English bilingual children based on retell narratives in both languages. One of the bilingual children who provided the sample was confirmed by their clinician, teacher and parents to be a child who stutters, while the other was confirmed by the same parties to be a typically fluent child. Although 10 of the 14 clinicians correctly identified the child who stutters, 12 of the 14 falsely identified the typically fluent bilingual child as a child who stutters. These data demonstrate that bilingual Spanish–English children may be vulnerable to misdiagnosis of developmental stuttering, even by experienced Spanish–English bilingual clinicians who have been practising for over 20 years.

The bilingual speech-language pathologists in Byrd et al. (2015a) attributed their false positive identification of stuttering in the typically fluent multilingual child to the child's frequent production of sound, syllable and monosyllabic word repetitions. Repetitions of sounds, syllables and monosyllabic words are one of four classic types of disfluencies that are considered to be 'stuttering-like' according to the monolingual English guidelines proposed by Ambrose and Yairi (1999). These disfluencies are also included in the most

widely used measure to diagnose stuttering, the Stuttering Severity Instrument (SSI; Riley, 1972, 1980, 1994, 2009), the norms of which were also based on monolingual English speakers who stutter. According to Ambrose and Yairi's criteria, as well as the SSI, an average of three repetitions per 100 syllables is sufficient to be indicative of stuttering in children. When they were questioned as to what influenced their decision to identify the typically fluent bilingual Spanish–English-speaking child as a child who stutters, the bilingual speech-language pathologists in the study by Byrd and colleagues reported that their reliance on these monolingual English guidelines as they were analysing these speech samples contributed to their (mis)identification.

There are additional preliminary data that further confirm that the apparent risk for false-positive identification of stuttering in multilinguals may be compromised by an overlap in the speech behaviours considered typical and those that are considered to be stuttering in mono- versus multilingual (Byrd, 2015b; Eggers, van Eerdenbrugh & Byrd, 2020; Gkalitsiou, Byrd, Bedore & Taliancich-Klinger, 2017; Taliancich-Klinger, Byrd & Bedore, 2013). For example, Byrd et al. (2015b) explored the types and frequencies of speech disfluencies that are produced by typically fluent bilingual Spanish–English children ($N = 18$; 5 to 6 years old). Two Spanish and English narratives – story tell and retell – were provided by each child. Irrespective of language dominance, 14 of the 18 bilingual children exhibited a mean percentage of 'stuttering-like disfluencies' that exceeded 3% per 100 syllables. In fact, if the 3% guideline had been employed, the majority of these bilingual children would have been classified as children who stutter despite no child, parent, teacher or clinician concern regarding their fluency.

Misidentification of typically fluent Spanish–English bilingual children as children who stutter were recently replicated by Eggers et al. (2019) in Yiddish–Dutch speakers. Eggers and colleagues investigated the frequency and types of stuttering-like disfluencies in 59 typically developing bilingual Yiddish–Dutch-speaking children. Participants (12 boys and 47 girls) were divided in two age categories: 6- to 7-year-olds and 9- to 10-year-olds. All children were Yiddish-dominant bilinguals with sufficient intelligibility in both languages. A conversational sample of at least 300 syllables was collected in each language. Similar to Byrd (2015b), the total amount of stuttering-like disfluencies produced was higher than the standard 3% stuttering-like disfluencies in both languages. The authors concluded that *typically fluent* bilingual Yiddish–Dutch-speaking children produce the types of disfluencies considered to be stuttering at a markedly higher frequency than what is considered to be indicative of stuttering in monolingual English children. However, these children, unlike their peers who stutter, do not have any parent, teacher or self concern that they may be stuttering. Additionally, their disfluencies were

produced in an effortless manner with no excessive tension. However, if a clinician were to rely only and/or primarily on the monolingual English-speaking guidelines, these typically fluent bilingual children would be at risk of being classified as stuttering.

Taken together, these data suggest that the use of monolingual English guidelines for assessment of stuttering in multilingual speakers may yield false-positive identification of stuttering in bilingual speakers who are, in fact, typically fluent, and that this risk is not limited to specific language dyads. In light of these data, it is critical to review past research related to stuttering in bilinguals to determine how many of these studies used the monolingual English-speaking guidelines for participant inclusion. Previous studies that have used these guidelines may need to be reassessed with the understanding that the bilingual participants may have been misidentified as stuttering when in fact they were typically fluent bilingual speakers who were producing disfluencies that were the result of navigating two languages.

Purpose of the present study

In summary, preliminary data demonstrate the use of monolingual English-speaking guidelines with bilingual speakers could lead to false-positive identification (e.g. Byrd et al., 2015a). Research has also demonstrated that the vast majority of investigations of bilinguals in the stuttering literature have been limited in the manner in which bilingualism is defined (for review, see Coalson et al., 2013; Werle et al., 2019). However, to date, it is not clear whether these studies of the manifestation of stuttering has also been compromised by the manner in which stuttering has been identified in the participants who were included. The purpose of the present study is to explore how stuttering is identified in bilingual speakers who are described as participants who stutter, and whether monolingual English-speaking guidelines were the most commonly used reference for determining the presence of stuttering.

Methods

A systematic review was conducted to identify the number of studies using multilingual participants who stutter. Descriptions provided for classification as a person who stutters, or inclusion criteria with respect to stuttering for multilingual participants were identified and examined to explore the reliance on monolingual frequency guidelines. Methodological procedures for database searches, terms, inclusionary and exclusionary criteria, as well as the review procedure replicated those used by Coalson et al. (2013) and Werle et al. (2019).

Search procedure and inclusionary criteria

Two online databases were searched to identify qualifying studies: (1) EBSCO (see Coalson et al., 2013; Werle et al., 2019 for the full list of databases included in EBSCO) and (2) Google Scholar. Literature was searched from 1900 through December 2018. Search terms included combinations of *bilingual*, *bilingualism*, *multilingual*, *multilingualism*, *stuttering*, *stutter*, *stammer* and *stammering*. Unique combinations of each variation of multilingualism and stuttering resulted in 16 different search terms.

For each document identified as relevant through the initial review procedure (described below), abstracts and methods were reviewed by the second author and a research assistant. Studies were included in the final review if the following inclusionary criteria were met: (1) multilingual participants who stutter were examined, (2) original data were reported, and (3) the full text was published or translated into English. Articles were excluded from the final analysis if (1) not reviewed in peer-reviewed journal (e.g. theses, conference proceedings or posters), (2) participants who stutter did not speak two or more languages, (3) stuttering was acquired, not developmental, in nature, meaning that the speaker had sudden adult onset of stuttering as the result of a traumatic neurological event, (4) the manuscript lacked original data, or (5) the full text was not available in English.

Review procedure

The 16 search terms across the two databases resulted in 5,365 unique entries. The titles and abstracts of these items were reviewed by the second author and a research assistant for relevance according to inclusionary and exclusionary criteria. Of these, 369 were included for more detailed review of methods. Of this subset, 162 were unpublished theses or conference proceedings; 114 contained participants who, per researcher report, were multilingual participants who did not stutter, or monolingual participants who stuttered. Ten papers were not available in English; 32 papers did not report original data. Two studies included stuttering described as neurogenic rather than developmental in nature, and one study could not be accessed via online databases or inter-library loan. Additionally, six papers (Jayaram, 1982, 1983, 1984, 1989; Kornisch, Robb & Jones, 2017a; Kornisch, Robb & Jones, 2017b) utilized the same cohort of participants in multiple studies. Given that they were the same participants across the studies, we only included Jayaram (1983) and Kornisch et al. (2017a), as the participants were described in the greatest detail in these two studies. Studies included in this review are marked with an asterisk (*) in the references (see Appendix A for all studies included).

Diagnostic criteria

Description of participant characteristics used to determine that the multilingual participant was a person who stutter was was reviewed. Diagnostic criteria were limited to these sections, and all subsequent descriptions of stuttering manifestation were excluded from the analysis. Every unique descriptor of diagnostic criteria was recorded. Each description was then categorized by its relationship to monolingual frequency guidelines of 3% stuttering-like disfluencies per 100 syllables. This was done to assess diagnostic criteria that stemmed from, though did not explicitly state, monolingual guidelines.

Results

Number of publications

Results of the analysis will first be presented for all studies identified in the review ($n = 44$), followed by studies specifically focusing on children ($n = 23$). In total, 44 independent studies with multilingual participants who stutter were published between 1900 and December 2018. Twenty-nine of these investigations were descriptive in nature – either describing the manifestation of stuttering in multilingual participants who stutter, or describing characteristics of multilingual participants who stutter. Eleven studies focused on the treatment of multilingual people who stutter, and four studies reported the prevalence of stuttering in multilingual populations.

Consistency of diagnostic criteria

Across the 44 studies, 18 unique descriptors of diagnostic criteria were employed. The frequency of each of the 18 unique descriptors with definitions are listed in Table 1. Of note, the descriptor 'DSM IV Criterion' refers to researchers utilizing the definition offered in the fourth edition of the *Diagnostic and Statistical Manual of Mental Disorders* which is widely used by clinicians, policymakers and the legal system to categorize and define specific conditions (American Psychiatric Association, 2000). The most frequently used diagnostic criterion was teacher or family report, used in 15 of the 44 studies (34%), which was reported with higher frequency than the following three descriptors: the presence of a previous diagnosis of stuttering (13 of 44 studies; 30%), use of the SSI (9 of 44 studies; 20%), and researcher judgement (8 of 44 studies; 18%) (For complete details of which descriptors each study utilized, see Appendix A.)

Table 1. Unique descriptions of diagnostic criteria and their frequency of use across studies including multilingual participants who stutter through December 2018

Descriptor	Definition	Use
1. Teacher/Family Referral	Teacher or family member referred participant for presence of stuttering.	15/44 **(34%)**
2. Previous Diagnosis	Author stated participants were previously diagnosed with fluency disorder.	13/44 **(30%)**
3. SSI	A published version of the Stuttering Severity Instrument was employed.	9/44 **(21%)**
4. Researcher Judgement	Diagnostic criteria not stated, or author determined talker group.	8/44 **(18%)**
5. Monolingual Frequency – One Language	Frequency of stuttering-like disfluencies were analysed for one language. Participant considered to be a person who stutters if their stuttering frequency met guidelines set forth by researchers.	7/44 (**16%**)
6. Previous Treatment	Participant received previous treatment for stuttering.	6/44 **(14%)**
7. Length of Time Stuttering	Length of time participant stuttered, as reported by participant, SLP, and or teacher/family.	5/44 **(11%)**
8. Self-report: Diagnosis	Participant self-report of presence of stuttering.	4/44 **(9%)**
9. Self-report: Severity	Participant self-report of stuttering severity.	4/44 **(9%)**
10. SLP Re-evaluation	SLP confirmed presence of stuttering for specific investigation (compared to reliance on previous diagnosis).	3/44 **(7%)**
11. Monolingual Frequency – Two Languages	Frequency of stuttering-like disfluencies were analysed for two languages. Participant considered participant to be a person who stutters if frequency guidelines set forth by researchers in each language.	3/44 (**7%**)
12. Judgement in Two Languages	Qualitative judgement for presence of stuttering by author, SLP or teacher/family was made in two languages.	3/44 **(7%)**
13. DSM IV Criterion	Diagnosis according to DSM IV must include 'one or more' frequent occurrences of SLDs by type, quality or interference with academic achievement.	2/44 **(5%)**
14. Qualitative Disfluency Count	Disfluency counts of speech samples analysed for disfluency type, frequency and production quality.	2/44 **(5%)**
15. 'Survey' in Two Languages	No further author description.	1/44 **(2%)**
16. 'Standard Clinical Assessment Tasks'	No further author description.	1/44 **(2%)**
17. Iowa Scale for Rating the Severity of Stuttering	Composite scale across several variables with a range of 0–7	1/44 **(2%)**
18. Severity Rating – SLP	Nine-point severity scale to assess stuttering severity, as rated by an SLP.	1/44 **(2%)**

Use of diagnostic descriptors were not consistent across studies, particularly with respect to those that relied on monolingual guidelines. Of the 10 studies that diagnosed stuttering based on frequency in one or both languages (descriptors 5 and 11 in Table 1), six (60%) reported the specific frequency cutoff for stuttering diagnosis. Of these six, only two utilized the 3% stuttered syllables criterion, while the other four utilized a less stringent requirement of 2% of stuttered syllables.

To assess internal consistency, we examined how many different descriptors researchers used to confirm stuttering in bilingual participants in each study. This analysis was completed to elucidate whether researchers utilized a combination of primary and secondary sources to confirm stuttering, or if they relied on a single source, and, if so, what source did most researcher consistently rely on. In terms of consistency within each of the 44 studies, the number of different descriptors utilized in a single study ranged from one to five (median = 2). Sixteen of the 44 studies (36%) classified stuttering with only one descriptor. These single descriptors consisted of a version of the SSI (n = 5), previous stuttering diagnosis (n = 2), teacher or family report (n = 2), self-reported diagnosis (n = 2), monolingual frequency in one language (n = 1), qualitative disfluency counts (n = 1), a 'survey' in two languages (n = 1), and researcher judgement (n = 2) (Appendix A). Thus, six of the eight criteria that were used in isolation were either derived from monolingual diagnostic criteria or were unclear in how stuttering was diagnosed. The 28 remaining studies utilized at least two criteria to diagnose stuttering in multilingual participants.

Use of monolingual guidelines for multilingual participants

To compare how frequently monolingual guidelines were applied for multilingual participants, the 18 unique descriptors were grouped into the following four categories: (1) descriptors that include monolingual guidelines, (2) alternative descriptors that do not rely on monolingual guidelines (e.g. qualitative disfluency counts, teacher or family judgement, self-report), (3) vague, unclear descriptors (with respect to reliance on monolingual guidelines) (e.g. 'standard clinical assessment tasks'), or (4) a combination of use of monolingual guidelines and unclear descriptors. As displayed in Table 2, five descriptors relied on monolingual guidelines, eight descriptors did not, and five were unclear.

Table 2. Frequency of diagnostic descriptors that relied on English-monolingual guidelines across studies including multilingual participants who stutter through December 2018

		Overall		*Children*	
Category	**Descriptors**	**Use**	**Exclusive use**	**Use**	**Exclusive use**
Monolingual criteria	1. Previous Diagnosis 2. SSI 3. Monolingual Frequency – One Language 4. Monolingual Frequency – Two Languages 5. DSM-IV	25/44 **(57%)**	12/44 **(27%)**	12/23 **(52%)**	6/23 **(26%)**
Alternative criteria other than monolingual guidelines	1. Self-report: Diagnosis 2. Teacher/Family Referral 3. Iowa Scale for Rating the Severity of Stuttering 4. Self-report: Severity 5. Qualitative Disfluency Counts 6. Length of Time Stuttering 7. Previous Treatment 8. Severity Rating by SLP	26/44 **(59%)**	7/44 **(16%)**	15/23 **(65%)**	6/23 **(26%)**
Unclear or vague criteria	1. SLP Re-evaluation 2. 'Survey' in Two Languages 3. 'Standard Clinical Assessment Tasks' 4. Researcher Judgement 5. Judgement in Two Languages	17/44 **(39%)**	4/44 **(9%)**	7/23 **(30%)**	2/23 **(9%)**
Combination	1. Reliance on Monolingual and Unclear/Vague Criteria	18/44 **(41%)**		8/23 **(35%)**	

Note. Values reflect the number of studies that included one or more of the descriptors listed within each category. Studies that used multiple descriptors within the same category (e.g. monolingual frequency and SSI) were tallied once within each category to avoid inflated representation across categories.

Twenty-five of the 44 studies (57%) reviewed included at least one diagnostic descriptor that relied on monolingual guidelines. Of these, 12 studies (27%) exclusively used monolingual guidelines to describe monolingual participants who stutter. Twenty-six of the studies (59%) included at least one alternative descriptor that did *not* rely on monolingual frequency guidelines, such as qualitative disfluency counts, or self-reports of stuttering severity. Seven of these studies (16%) exclusively used these alternative diagnostic descriptors. These results suggest that the majority of studies relied on the monolingual guidelines to make their decisions regarding whether or not the participant was a speaker who stutters, but they also included alternative guidelines, rather than limiting their decision to use of the monolingual guidelines alone. However,

results also revealed that for those studies that employed only one criterion, for the majority the one criterion was the monolingual guidelines.

The remaining studies relied on less specific criteria. Seventeen studies (39%) included at least one descriptor that was vague or unclear in terms of use of monolingual guidelines. Four studies (9%) exclusively utilized vague descriptors such that accuracy of diagnosis of stuttering cannot be determined. Most striking, 18 studies (41%) either exclusively relied on monolingual frequency guidelines, used ambiguous descriptors, or both to classify multilingual participants who stutter. In sum, nearly half of all studies reviewed utilized either inappropriate and potentially inaccurate criteria to diagnose stuttering, which calls into question the validity of the results of these studies.

Based on the unique challenges inherent to diagnosis of stuttering in children versus adults, an additional analysis was completed to investigate whether studies that focused on children may employ more comprehensive or stringent diagnostic guidelines. As depicted in Table 2, patterns of diagnostic criteria within the 23 studies that focused exclusively on children differ with respect to diagnosis of stuttering across all 44 studies (Appendix A). While the proportion of studies that include diagnostic criteria that rely on monolingual guidelines is similar to the overall pattern, studies investigating stuttering in children more frequently and more exclusively used alternative diagnostic criteria. This suggests that, when faced with the task of differentially labelling normal disfluencies that arise from the development of multiple languages rather than the presence of developmental stuttering, researchers may be aware that monolingual guidelines alone are not sufficient, and much more nuanced assessment is required.

Discussion

Crosslinguistic and bilingual research suggests that the frequency and types of speech disfluencies observed over the course of development vary with the specific languages spoken and proficiency in each language (Byrd, 2018). An increased number of speech disfluencies may reflect linguistic uncertainty with respect to their linguistic input and output in multiple languages. That is, they may be more or less disfluent in one language than the other depending how well they are able to understand and produce each of those languages. Interestingly, research shows increased disfluencies when proficiency is high and when proficiency is low, suggesting that increased knowledge of the language may yield more decisions that can made when formulating speech, and limited knowledge can also contribute to increased uncertainty that can compromise the speaker's speech fluency. Results from this review indicate

that nearly half of the studies (41%) relied on monolingual English criteria to describe or qualify research participants as persons who stutter. Of the 44 studies, 18 (41%) either relied exclusively on monolingual diagnostic criteria (n = 12), used unclear, vague diagnostic criteria (n = 4), or both (n = 2). Over-reliance on monolingual criteria to diagnose stuttering in multilingual speakers suggests a fundamental lack of understanding about how stuttering manifests in linguistically diverse populations, and increases the likelihood of overidentification.

The language sample of a monolingual English speaker cannot be considered equivalent to the English output of a bilingual speaker (Bedore & Peña, 2008). Bilinguals who speak a variety of languages have been shown to produce significantly more disfluencies in comparison to monolinguals (e.g. Byrd et al., 2015b, Eggers et al., 2020; Fiestas, Bedore, Peña & Nagy, 2005; Poulisse, 1997; Wiese, 1984). The use of monolingual English guidelines in stuttering research cannot adequately accommodate for the distinct differences in speech disfluency inherent to bilingualism. In lieu of valid bilingual or multilingual criteria to diagnose stuttering, the use of alternative criteria other than monolingual guidelines to classify group status may be the next best option. As seen in Table 2, 59% (n = 26) of the 44 studies included at least one alternative descriptor, and only 16% (n = 7) relied *exclusively* on these alternative criteria. While the studies that focused on children maintained the pattern from the broader cohort of a significant portion relying exclusively on monolingual guidelines (26%), child studies more consistently reported use of alternative criteria. Of the 23 child studies, 65% (n = 15) included at least one alternative descriptor that did not rely on monolingual criteria, and exclusive use of alternative descriptors was more common (26%) than observed for the combined adult and child studies (16%). Although we view this pattern as encouraging, and perhaps preferable to classifying participants based on the known limitations of monolingual stuttering criteria, we cannot be certain that these alternative descriptors were sensitive or sufficient to accurately classify multilingual speakers without further investigations.

Of the eight alternative descriptors identified, three included diagnostic factors other than stuttering frequency – length of time stuttering, previous treatment for stuttering, and qualitative disfluency counts. Given the propensity for false-positive diagnoses and spontaneous recovery, metrics such as length of time stuttering and whether the participant previously received speech-language treatment for stuttering may not be reliable measures to confirm a diagnosis of stuttering in multilingual speakers, especially if used in isolation. Qualitative disfluency counts, on the other hand, may capture the unique quality of stuttered speech previously found to differentiate stuttered speech in multilinguals: specifically, tension and rhythmicity (Byrd et al.,

2015b). Other factors such as self-reported severity of stuttering may serve as a more reliable indicator of diagnosis, particularly for older participants. That is, multilingual participants with a lifelong history of stuttering are less likely to incorrectly identify themselves as a person who stutters than an unfamiliar listener or examiner relying on monolingual guidelines.

If, in fact, participants were included in these studies based on a reliance on the monolingual English-speaking guidelines, and a lack of understanding of the typical disfluent speech of bilinguals, then the data published thus far may be further compromised than originally thought. Both Coalson and colleagues (2013) as well as Werle and colleagues (2019) have demonstrated that participant description as it relates to bilingualism is significantly lacking in breadth and depth in the existing literature, making it nearly impossible for readers to determine the potential influence of their history, proficiency, and use of their respective languages. The present study demonstrates that, in addition to inadequate description to determine language status (mono- versus multilingual), researchers also rely on inadequate or inappropriate description to determine whether the speaker is typically fluent or is a speaker who stutters. The additive effect of inadequate description of language-status *and* talker-status compromise the available literature much more than either factor in isolation, and further restrict our ability to describe speech behaviour in this unique clinical population.

Furthermore, as Byrd (2018) has previously argued, without having any point of reference for what is considered to be *typical* speech disfluencies in the bilingual population and how those typical speech disfluencies compare to what has been documented in the monolingual literature, it is difficult, if not impossible, to determine what is *atypical*. Preliminary data suggest what overlaps across monolingual English-speaking children who stutter and bilingual speakers who stutter is not the quantity but the quality of the disfluencies produced (Byrd et al., 2015b; Eggers et al. 2020). Specifically, the tension and the timing of the disfluent speech productions are markedly different in speakers who stutter in comparison with speakers who do not, regardless of the languages they speak. Based on Byrd's (2018) recommendations, and the pervasive misuse of monolingual frequency-based criteria in the existing research identified in the present study, additional research will be needed to adequately describe disfluencies produced by bilingual speakers of various language dyads.

Conclusion

Review of the research indicates that a non-trivial percentage of studies that include bilingual participants who stutter have relied on monolingual English guidelines when identifying stuttering in speakers of more than one language. Based on previous data, it is likely that some of the participants identified as persons who stutter may have been typically fluent, but produced more disfluencies than monolingual English speakers because of the challenges of navigating more than one language. Future research should explore the disfluencies of multilingual speakers who do and do not stutter as they differ from each other and from monolingual English speakers to improve diagnostic validity of stuttering in speakers of more than one language. To mislabel a typically fluent/multilingual child as child who stutters limits our understanding of speech and language development in bilingual populations and misappropriates limited clinical resources.

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Appendix A

The following table presents all studies included in systematic review and the descriptors they utilized. See Appendix B for all descriptors. Studies denoted with an asterisk (*) indicate they focused exclusively on children who stutter. Check marks denoted with a cross (+) indicate the frequency criterion utilized was explicitly stated as 2%, whereas a dash (–) indicates it was stated as 3%. Finally, as regards type, studies documenting prevalence are labelled 'P', those that are descriptive in nature are labelled 'D', and those that investigated treatment, 'T'.

Study	Type	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
Al-Yaari, Al Hammadi, Alyami & Almaflehi (2013)	T												✓					✓	
Andrews, O'Brian, Harrison, Onslow, Packman & Menzies (2012)*	T							✓							✓				
Andrews, O'Brian, Onslow, Packman, Menzies, & Lowe (2016)*	T	✓																	
Ardila, Ramos & Barrocas (2011)	D	✓						✓		✓			✓						
Bakhtiar & Packman (2009)*	T							✓											
Bernstein Ratner & Benitez (1985)	D						✓												
Brown, Wilson, Packman, Halaki, Onslow & Menzies (2016)	T	✓								✓									
Carias & Ingram (2006)*	D							✓											
Dale (1977)*	D						✓												
Druce, Debney & Byrt (1997)*	T	✓					✓	✓				✓							
Firozjaei (2013)*	D	✓				✓													
Gkalitsiou, Byrd, Bedore & Taliancich-Klinger (2017)*	D													✓					
Gough, Connally, Howell, Ward, Chesters & Watkins (2017)	D		✓																
Hernández-Jaramillo & Gómez (2015)	D	✓											✓						
Howell, Davis & Williams (2009)*	P	✓	✓																
Jankelowitz & Bortz (1996)	D							✓										✓	
Jayaram (1977)	D																	✓	✓
Jayaram (1982)	D																	✓	
Karniol (1992)*	D							✓		✓									
Kornisch, Robb & Jones (2017a)	D	✓								✓									
Koushik, Shenker & Onslow (2009)*	T			✓+															
Lattermann, Shenker & Thordardottir (2005)*	T			✓−				✓	✓			✓							

Study	Type	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
Lim, Lincoln, Chan & Onslow (2008)	D	✓		✓+															
Lim, Lincoln, Onslow & Chan (2015)	D	✓		✓+															
Malek, Amiri, Hekmati, Pirzadeh & Gholizadeh (2013)*	D	✓																	
Mamdoh & Gomaa (2015)*	D		✓																
Maruthy, Raj, Geetha & Priya (2015)	D		✓																
Mohammadi, Bakhtiar, Rezaei & Sadeghi (2012)*	D				✓			✓											
Mohammadi, Khazaie, Rezaei & Joghataei (2016)*	D							✓							✓				✓
Mohamadi, Nilipour & Yadegari (2008)*	P					✓		✓											✓
Morrish, Nesbitt, le Rouz, Zsilavec & van der Linde (2016)	D		✓																
Nwokah (1988)	D				✓													✓	
Osipovskaya, Sharifzyanova & Zamaletdinova (2016)*	D															✓			
Raza, Gertz, Mundorff, Lukong, Kuster, Schäffer & Drayna (2013)	D		✓										✓						
Roberts (2002)	D									✓		✓	✓				✓	✓	
Schäfer & Robb (2012)	D			✓-											✓				
Stern (1948)*	P							✓										✓	
Taliancich-Klinger, Byrd & Bedore (2013)*	D										✓								
Travis, Johnson & Shover (1937)*	P																	✓	
Tsai & Ratner (2016)	D		✓																
Vong, Wilson & Lincoln (2016)*	T				✓+			✓				✓							
Whillier, Hommel, Neef, von Gudenberg, Paulus & Sommer (2018)	D	✓	✓																
Woods & Wright (1998)	T						✓	✓					✓						
Zaretsky, Lang, Euler, Robinson & Neumann (2017)*	D	✓	✓	✓				✓				✓							

Appendix B

Descriptors with alphabetical label utilized in Appendix A.

Alphabetical label	Descriptor
A	Previous Diagnosis
B	SSI
C	Monolingual Frequency – One Language
D	Monolingual Frequency – Two Languages
E	DSM-IV
F	Self-report: Diagnosis
G	Teacher/Family Referral
H	Iowa Scale for Rating the Severity of Stuttering
I	Self-report: Severity
J	Qualitative Disfluency Counts
K	Length of Time Stuttering
L	Previous Treatment
M	Severity Rating by SLP
N	SLP Re-evaluation
O	'Survey' in Two Languages
P	'Standard Clinical Assessment Tasks'
Q	Researcher Judgement
R	Judgement in Two Languages